Modular Micro Propulsion System

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The miniaturization of space applicable devices by means of MEMS technology is pursued by many research groups. MEMS devices are often designed as stand alone and require individual packaging which often makes them still quite large. Focusing on the integration of several MEMS components has the advantage of reducing size and mass much more. An integrated and miniaturized cold gas propulsion system for micro satellites is presented which consists of a valve, a particle filter, a pressure sensor, a nozzle and a gas tank.

By selecting a convenient package first and adjusting the MEMS part to fit the package, costs are reduced and modularity is obtained. The baseline of the system is a glass tube bonded on a silicon disc which contains a valve seat as shown in Figure 1. The valve is normally closed by an embossed membrane which is stacked inside the glass tube. A piezo-disc is glued to the boss of the membrane to actuate the valve. The glass tube is functioning as hermetically sealed package as well as fluidic interconnect with the macro world. The pressure sensor and particle filter are suspended in the glass tube. This integrated system is connected to a pressurized N_2 gas tank which is developed by TNO [1]. The tank contains 8 cold gas generators which makes it possible to reduce the working pressure to 3.4bar without compromising on the amount of gas.

During the symposium the technical development and results will be presented.

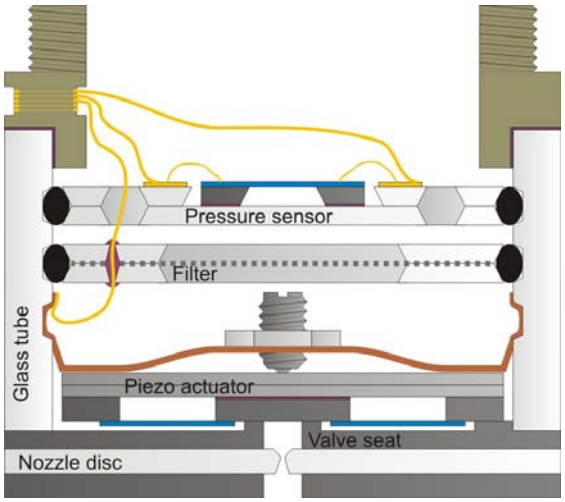

Fig. 1 *Schematic of the propulsion system*

References

[1] N. Rackemann, *'Design and Development of a Propulsion System for a Cubesat – Based on Micro Cool Gas Generator Technology'*, 29-3-06